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Department of Agriculture

ANNUAL REPORT

for the year

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Northern Rhodesia.

DEPARTMENT OF AGRICULTURE.

Annual Report for the Year 1943.

In accordance with instructions this report is presented in abridged form. The issue of Agricultural Statistics forms to European farmers has been suspended during the war period. Reliable figures for the quantities of the more important crops produced for sale by farmers are, however, available from other sources.

AGRICULTURE IN THE TERRITORY.

1. Taken as a whole the season was an unfavourable one which belied its early promise. In most rural areas food crops were adequate for subsistence and in places produced surpluses, particularly in parts of the Eastern Province, but the main region of economic production had another disappointing year.

Maize : Railway Belt.

2. Production of maize was little greater than in 1942. The planting season was somewhat later than usual and was followed by exceptionally heavy rain in January. Nevertheless, at one time the crop looked reasonably promising, certainly much better than its predecessor. Shelling returns were, however, most disappointing and indicated poor pollination of part of the crop. Even so, European production would have been much greater but for the fact that several of the large maize growers suffered disproportionately heavily. The effect of their short-fall will be appreciated when it is stated that over one half of our production for sale normally comes from 20 large growers. There was no very substantial increase in European maize acreage, partly on account of the difficult planting season. The total production of maize on European farms approximated to 200,000 bags with an average yield of about 5 bags per acre.

3. The native-grown crop in the railway belt was extremely patchy and in some areas yielded barely enough for subsistence. Production for sale certainly increased slightly, probably rather more than Maize Control Board figures indicate, as inter-village trade expanded somewhat.

4. The following table shows maize production for sale in the railway belt, exclusive of inter-village trade, during the last three years :

MAIZE PRODUCTION FOR SALE.

(Thousands of Bags.)

Year	*European*	*Native*	*Total*
1941	120	38	158
1942	146	51	197
1943	144*	60	204

* This figure includes some 30,000 bags delivered before the 31st May in response to an appeal, and will therefore be excluded from the returns for the Maize Control Board's pool-year, 1943-44.

5. In addition to the 204,000 bags received from the railway belt, 9,000 bags were sent in from distant areas. The bulk of this came from Fort Jameson District.

6. Sales of maize fell from 440,000 to 391,000 bags. 276,000 bags were imported. Some 17,000 bags of other grain were sold, of which the bulk was imported. The fall in consumption was due to the introduction of maize rationing

Wheat.

7. Increased water supplies and development of irrigation works resulted in a larger acreage under wheat. A record crop of about 20,000 bags was sold, of which 15,000 bags were exported to Bulawayo for milling. The price of wheat rose to 30*s*. per bag.

Other Food Crops.

8. The groundnut crop was almost a complete failure in the railway belt. A fair crop of beans came on the market and potato production increased. The Luapula and Bangweulu regions of the Northern Province produced 20,000 bags of cassava meal for sale.

Tobacco: Eastern Area.

9. This area enjoyed an average season. Production of Virginia leaf fell by 500,000 lbs. to 1,826,000 lbs. but prices were higher. At the auction sales quota tobacco fetched an average of 29.87 pence per lb. and non-quota 11.77 pence. The over-all price was 15.44 pence per lb., over 2 pence per lb. more than that received in 1942.

Tobacco: Western Area.

10. Weather conditions were reasonably good but the Virginia crop was disappointing both in yield and quality. Wastage in handling was higher than usual owing to shortage of labour. Production of saleable Virginia leaf was 304,000 lbs. approximately that of last season. Some 40,000 lbs. of Turkish leaf were sold. As no auction sales are held in the Western Area prices cannot be given.

Rubber.

11. The department continued to purchase, check-grade and despatch wild rubber to the Union of South Africa. Following a visit of the Rubber Mission to which representations were made, a substantial increase in prices was offered and a new range of grades for tapped sheet was introduced. During the year exports comprised the following:

Description	*Grade*	*lbs. exported*	*Current Price per lb. f.o.r. Mazabuka* s. d.
Tapped Sheet	S.T.1	4,925	2 6
	S.T.2	2,744	2 0
	S.T.3	673	1 3
Tapped Ball	T.1	6,681	2 3
	T.2	3,780	1 9
	T.3	1,035	1 0
Bark Rubber	B.1	6,854	2 0
	B.2	21,571	1 6
	B.3	17,234	0 9
	Undergrade	4,234	0 6
	Total	69,731 lbs.	

12. The Ecologist made a study of Native methods of preparation and, after experiment, devised improvements. The improved methods were described and published in two pamphlets. He also undertook a tour of the principal producing areas with the objects of stimulating production and improving quality. The response was but moderate. There was a slight but definite improvement in quality but production remains at a low level.

13. It has been established that the reserves of wild *Landolphia* and *Carpodinus* rubber-bearing species are virtually inexhaustible relative to population available for collection in Mwinilunga and Balovale Districts and in parts of the Barotse Province. A conservative estimate of potential production by the available resident population, using hand methods only and with due allowance for the priority which must be given to food production, is given below, together with the actual production in 1943:

District	*Potential Production (tons)*	*Actual Production (tons)*
Balovale	108	4.5
Mwinilunga ...	90	16.7
Mongu	45	3.3
Senanga	41	1.2
Mankoya... ...	36	4.6
Kalabo	28	nil
Sesheke	15	5.1
	363	35.4*

* Some of this rubber was received too late for export in 1943. Other parts of the Territory in which wild rubber is not so plentiful produced, collectively, 5.3 tons during the same period.

14. In spite of the fact that, grade for grade, the prices offered in Northern Rhodesia are much higher than those offered in any other territory, our production is but one-tenth of a conservative potential and, in the absence of some form of compulsion, is not likely to increase to more than one-fifth. This gives a striking illustration of the adverse effect of high industrial and other wages, combined with almost unlimited opportunity for employment, on the development of rural economic production.

Locusts.

15. Early in the year hopper concentrations of the Red Locust (*Nomadacris septemfasciata*) were observed in the Mweru Marsh region, a recognised outbreak-centre for this species. A campaign against them was waged by the Inter-territorial Locust Organisation. From June onwards there was invasion from territories to the east by considerable numbers of flying swarms. Some of these swept south-westwards across the Territory reaching the farming area of the railway belt in October. Others passed through the northern part of the Territory rather earlier and reached Balovale District in October. The passage of these swarms over outbreak-centres rather upset the routine observations made by the Inter-territorial Organisation on the indigenous solitary phase, for some of the invading swarms settled in the outbreak-centres. Heavy hopper concentrations were found at the end of the year and, as far as is known at present, these resulted from invasion and not from local building-up. A new campaign has been started in the Mweru Marsh region by the Organisation. Some egg-laying, not very extensive, also occurred in the Southern Province late in the year. Throughout the year damage to crops was negligible.

Tobacco Beetle.

16. During the year large consignments of cigarettes and tobacco were found to be infested with Tobacco Beetle (*Lasioderma serricorne*) and were destroyed. This outbreak, the first for many years, may be ascribed to the war-time packings. The pest is normally killed in the process of manufacture and could not gain ingress through the normal packing but had little difficulty in doing so through the packings at present employed. The manufacturers are doing all in their power to deal with the matter but seasonal infestation may not be wholly avoidable.

Food Production Committee.

17. The activities of this body, of which I am Chairman, will be recorded in a separate report.

THE WORK OF THE DEPARTMENT.

18. Two additional Agricultural Officers were appointed during the year and one earlier appointment was terminated by resignation. Two new Agricultural Supervisors were appointed and a third was released from the Army for civil duty. One additional part-time Clerk was employed. Almost all the staff increases occurred late in the year, thus the effective strength of the establishment remained practically unaltered. At the end of the year the European establishment was :

Director.
Assistant Director.
Ecologist.
10 Agricultural Officers.
8 Agricultural Supervisors.
4 Clerks (two part-time).

19. Two Agricultural Officers were detailed for soil conservation, food production and advisory work among European farmers, but the number was reduced to one by resignation half-way through the year. Lines for contour ridges were laid out on 28 farms in the railway belt and advice on dams, weirs and irrigation furrows, in most cases with lay-outs, was given on 50 farms. The Agricultural Officers concerned were constantly on tour.

20. Late in the year a 4,000 acre farm was acquired near Lusaka to serve as a wheat and general experimental station. It was impossible to start development work before the end of the year.

21. In response to a request from the Fort Jameson tobacco planters, the departmental tobacco station was re-opened for the purpose of providing acclimatized seed.

22. Building as usual formed a tiresome but necessary part of the departmental programme. The more important buildings constructed during the year were : a cottage and seed stores at Lunzuwa, departmental offices at Fort Jameson and tobacco sheds at Minga. Semi-permanent field-camps were also constructed in the Western and Southern Provinces.

23. As a contribution to food supplies for the Polish Evacuees Camp at Abercorn, the department grew 60 bags of rye for seed and prepared 400 acres of land for planting to this crop early in 1943. This additional work, which had to be undertaken at extremely short notice, imposed a great strain on the already inadequate European staff in the Northern Province. Happily it was possible to afford relief at the end of the year by the posting of an additional Agricultural Officer and Agricultural Supervisor.

Experimental Work.

24. Since the war began experimental work has been reduced to a minimum in order to free the available staff for food production and reclamation work. One result is, however, worth recording as it may form the solution, if perhaps a laborious one, to the problem of maintaining soil fertility in areas devoid of livestock. At Lunzuwa a randomized plot experiment yielded the following results :

(a)	*No compost series (control)*	4 bags maize per acre.
(b)	*Green grass and leaves compost series*	12¾ bags maize per acre.
(c)	*Green and old grass compost series*	11¾ bags maize per acre.
(d)	*Sheep compost series*	13½ bags maize per acre.

The differences between the several compost series were insignificant but all treatments were definitely superior to the control. The rate of dressing was too high for practical purposes—25 tons per acre—and this may have masked differences between the various composted plots. It does appear, however, that by using the high nitrogen content of young green grass a very satisfactory compost can be made without animal agency. The experiment confirmed the opinion formed from observations on plots of wheat, similarly treated, in the preceding season.

25. Forestry continued to be administered as a sub-department. The year's work is briefly reviewed in Part II of this report.

Reclamation and Preservation of Native Areas.

(*a*) Southern Province.

26. Soil conservation in the main Native maize producing area was continued at approximately the pace set in 1942. For some miles round Kanchomba, the original departmental station in the maize belt, almost all the Native gardens requiring protection by field works have now received attention, and the main gangs have been shifted to more distant areas. The progress of the work during the last four years is illustrated in the following table :

Year	*Acres of cultivated land protected*	*Miles of contour ridge constructed*	*Miles of grass strips demarcated*
1940	3,700	64	18
1941	9,100*	146	50
1942	11,800	253	18
1943	11,400	280	12
Totals	36,000	743	98

* *This figure was given, in error, as* 12,100 *in the* 1941 *Report.*

The area given as " protected " refers to gardens only. A vastly larger area of the countryside benefitted from the works which, in addition to the construction of contour ridges, included the demarcation of land into appropriate arable and grazing areas.

27. The soil conservation works were constructed almost entirely by hand labour, the cost of which rose during the course of the year. In spite of this, a more efficient task-work system succeeded in keeping the cost per yard of completed ridge at 2.6 pence—approximately the cost in 1942. The figure includes cost of implements and African supervision. The cost per acre of protected land naturally depends on topography which governs the amount of construction necessary. It varied between 3*s.* 9*d.* and 15*s.* per acre, with an average cost of 10*s.* 4*d.* This figure is somewhat higher than that of 1942 because a fair proportion of the year's programme consisted of the protection of steeply sloping gardens in the hill country to the east of Pemba. The entire cost of soil conservation work (exclusive of European supervision) in the Southern Province was met from a grant from the accumulated surpluses of the Native Maize Pool. The money was thus contributed by the collective Native maize growers and was spent on the protection of the land which produced it.

28. Other works undertaken departmentally included the making of 36 miles of roads and the repair and improvement of five dams. Funds for these purposes were provided by the Plateau Tonga Native Treasury.

29. In the last report it was explained at some length why the protection of Native maize areas is proceeding much faster than the complementary essential to continued productivity—the improvement of farming methods on protected lands. Unfortunately very little real progress in method can be reported. A slight tendency toward more thorough weeding could be observed and the use of manure is spreading gradually, but the fact remains that the present pace of improvement is too slow to avert a calamity in the not far distant future. There can be little doubt that the fertility of these economically important and quite irreplaceable areas is still declining, even though the rate of retrogression has been retarded by the provision of soil conservation works. That essential preliminary to the general introduction of improvements—conclusive demonstration—has been accomplished. The time is now ripe for firm and enlightened action by the Native Authorities. Without such action the department is powerless to do more than exhort, and the experience of the past six years has been that exhortation by itself accomplishes little.

30. The extent of the transformation which *could* be effected within a short period was amply proved during the year. There was fairly conclusive evidence that the average yield of Native maize did not exceed 2¾ bags per acre. On seven gardens cultivated by " village demonstrators " the average yield was 5¼ bags per acre, which approximated closely to the yield on European farms. The demonstration gardens were widely scattered and were representative of the maize area in that they comprised a fairly complete range of soils in varying degrees of exhaustion. The demonstrators were compelled to follow departmental instructions but they were otherwise unaided. The highest yield obtained was 13 bags per acre (77 bags from 6 acres) from a garden which only produced 2½ bags per acre before being taken over two years ago. The lowest was 3 bags per acre from a garden which was completely worn out in 1941. Even a slight increase in yield makes an enormous difference to the quantity of Native maize available for sale. Domestic requirements may be taken at about 2¼ bags per acre ; an increase of 1 bag per acre above this figure would render available for sale approximately

100,000 bags of maize. Thus in the season under review, had every Native grower adopted the simple improvements practised by the demonstrators, the commercial Native crop would have been of the order of 300,000 bags instead of the paltry 60,000 bags actually tendered for sale in the main maize area. More important still, the productivity of the land, instead of being on the decline, would be definitely increasing.

(*b*) Eastern Province.

31. In the Eastern Province the method of approach to soil preservation is the dilution of population in the intensely congested Reserves by planned settlement of the newly purchased areas, followed by soil conservation works in the Reserves themselves.

32. During the year land settlement was concentrated mainly on a westerly movement from Fort Jameson District towards, and into, Petauke District. The new area runs from Sinda to Minga, a distance of roughly 45 miles, and extends for 20 miles on each side of the Great East Road between these two places. Some of the villages had to move as much as 60 miles and assistance in the transport of foodstuffs was given departmentally. On the whole the moves were accomplished without much friction. Initial opposition to change is innate but tends to be more vocal than real. When once the moves had been completed the majority of the villages involved stated that they were thoroughly content with their new areas. Indeed, so far as is known, all villages which have been moved during the last three years consider themselves vastly better off than they were on their old sites. In this matter fate has been unusually kind, for, during the past two seasons, the crops in the new areas have been excellent.

33. The progress of land settlement work in the Eastern Province is as follows :

Year	*No. of villages moved*	*Population*
1941 ...	16	2,000
1942 ...	140	16,000
1943 ...	115	15,000
Total ...	271	33,000

The rate of future settlement will be slower for reasons beyond departmental control. It will be governed largely by the provision of water supplies and, in some areas, by the effectiveness of a programme for the eradication of sleeping sickness.

34. It is a cardinal principle of the settlement scheme that steps should be taken to ensure that the new areas are not ruined by wasteful and indiscriminate cultivation. This necessarily involves a measure of agricultural control which is naturally unpopular. Here again, opposition tends to disappear under sympathetic but firm handling. In the new areas an elementary system of soil conservation was introduced by demarcating lands for cultivation separated by grass strips (" tenyardis "). This is now being followed by an attempt to replace the traditional mound-cultivation, which is notoriously conducive to soil erosion, by cultivation on ridges running roughly on the contour. Villages which adopt contour ridge cultivation are permitted to abolish the " tenyardis " and this bait has proved effective in many instances. There is some indication that crops on the ridges are superior to those grown on mounds. No such immediate result was anticipated and it may yet prove illusory. The aim was a much more far-reaching one—the preservation of the soil for future crops.

35. For the first time " early-burning " of grass was instituted on a large scale in parts of the Province. The scheme was carried through without difficulty and was successful in protecting the areas treated from the devastating late fires which occur annually almost throughout the Territory.

(*c*) Northern Province.

36. Supervision of the large area now under " Chitemene Control " had to be left mainly to the African staff on account of the demands of food production on the time of the European staff. On the whole the scheme is working very well and there is evidence that the effect of " early-burning " is definitely improving regrowth of trees in the lopped areas. The Natives themselves are beginning to appreciate this. It is far too early to say whether or not the scheme will achieve its ultimate objective—the rendering possible of a limited but adequate amount of " Chitemene " culture in perpetuity. All that can be said at the moment is that it promises well and that it has arrested the appalling rate of deforestation which was characteristic before its inception. Concentration of agricultural staff on the area has also resulted in the devotion of larger areas to gardens cultivated in a more orthodox manner and in an increase in the variety of subsidiary crops.

37. Most of the former demonstration plots and seed farms were maintained but a few which could not be adequately supervised in present circumstances were closed down. These plots and farms serve a most useful purpose in addition to their demonstration value. They are used for bulking seed of improved varieties and for increase plots of mosaic-resistant cassava. From one farm alone over 2 tons of improved seed (mostly maize) was distributed, together with large quantities of cassava cuttings.

(*d*) Western Province.

38. In July, resettlement work was started in the Western Province when the Assistant Director, two Agricultural Officers and one Agricultural Supervisor were transferred to Ndola. A District Officer had previously been seconded for the administrative side of the work.

39. The over-population problem in Ndola District is not due to any general shortage of land but to maldistribution of population brought about primarily by displacement of peoples from the Copperbelt, the creation of reserves and, to a lesser degree, by migration to the neighbourhood of the mines. As a result of these factors, about half of the district population occupies little more than 1/20th of the land which is now available.

40. The congested areas, consisting largely of the chieftaincies of Nkambo, Mushili and Chiwala, border the Copperbelt to the south and east. Preparations for the controlled movement and resettlement of populations from these areas was begun early in July. While the District Officer carried out propaganda and preparation of village statistics, the agricultural staff concentrated on reconnaissance surveys of the areas to be settled and the making of roads. Vegetation-soil traverses were made along a series of east-west lines one mile apart and north-south lines two miles apart and maps were constructed from this grid. By the end of the year 450 square miles of uninhabited country had been surveyed and mapped in this way. Road plans were drawn up on the basis of the information provided by the survey and by the end of December some 94 miles of road had been completed by the departmental staff, in addition to roads made by the District Officer.

41. Three main camps were built in the settlement area and a fourth camp to serve as a sub-Boma was built by the District Officer at the Kafulafuta crossing, the main entrance to the area. Fruit-tree nurseries and rice plots, for demonstration purposes and the bulking of imported " Faya " seed, were established at these points. During December a large number of pawpaw seedlings and banana suckers were distributed to villages, mostly in the uncontrolled area.

42. The first step in resettlement was to demarcate an uncontrolled settlement area, between the Kalalangabo and Kafulafuta Rivers, into which villages in very urgent need of new land were permitted to move. This gave immediate relief to the most seriously congested part of the Lamba-Lima Reserve.

43. The area surveyed during the year provided land sufficient in quality and quantity for about 70 average villages. Land allocation started towards the end of the year. 15 village areas had been allocated by the end of December and the permanent boundary lines were being cut.

44. Anti-erosion work was started in Mushili's area of the Lamba-Lima Reserve and in the uncontrolled settlement area. As a general method contour lines were pegged out at vertical intervals of 2 feet along which small primary ridges were constructed by the people. In the uncontrolled area other means of protection were tried to find that best suited to local conditions. The land of 38 villages some 3,000 acres in all, had been protected by the end of the year.

Cash Crops.

45. For the time being there is hardly a district in Northern Rhodesia which has not an outlet for surplus foodstuffs. The two more permanent projects, cotton and tobacco production in the Eastern Province, were maintained under departmental supervision and financed by grants from the Native Development Board.

(*a*) *Burley Tobacco.*

46. This is grown round Minga (Petauke District). A most favourable season was enjoyed and there was marked improvement in the quality of the leaf tendered by Native growers. The total production of 326 growers was 65,000 lbs. which was purchased at an average price of 3.94 pence per lb. The average return per grower was £3 5*s.*, approximately £1 more than the average return of former years. The tobacco was graded and packed departmentally and transported to the Fort Jameson Auction Floor where it was sold for £2,900. The average price received for the finished product was 11.68 pence per lb. During the last few years sales of leaf have more than covered the expenses of buying, handling and transporting the crop. Various suggestions for the disposal of accumulated profits and for the future management of the industry are now under consideration.

(*b*) *Cotton.*

47. In contrast with the tobacco industry, the Marambo cotton growing project suffered a set back. The number of growers fell to less than 300 and production to 46,000 lbs. seed cotton. The planting season was late and unfavourable and was followed by heavy rains and floods. Some alluvial gardens were, in fact, completely washed away. Stainer and bollworm damage was heavier than usual. The crop was purchased at $\frac{3}{4}d.$ per lb. and was ginned and baled departmentally. The average return per grower was but 9*s.* 8*d.* A trial consignment of 4 tons of lint was despatched to Gatooma (Southern Rhodesia) and sold at 9*d.* per lb. The cleanliness and quality of the lint received favourable comment. The balance was disposed of locally.

Agricultural Education.

48. Model maize gardens were cultivated at 25 schools in the Southern Province with mixed results. Some were remarkably good and others somewhat disheartening. Success depends largely on the keenness and initiative of the Head Teachers who have to overcome the difficulties imposed by lack of equipment and the incidence of school holidays. A few mission pupils are being trained at the agricultural stations for subsequent work in school gardening. In the Eastern Province success has also been varied, but the garden at the Angoni National School is now providing an excellent demonstration of the maintenance of fertility of an inferior sandy soil by rotation and manuring.

The soil in question would not have been cropped under traditional methods for more than two seasons. It has yielded excellent crops for five. A five-acre garden was laid out and supervised at Ndola Farm School (Western Province). In the Northern Province most of the school gardens were visited. The standard of the majority is high and is improving. The first course at Senga Hill Agricultural Teacher-Training School has now reached its final year and several trained Teachers will become available in 1944. Three Teachers who completed their training at Senga Hill before the recognised course began are already at work and have set a very high standard indeed for the remainder to follow. There is now no doubt that in future years large numbers of Northern Province school children will receive a sound and practical training in agricultural methods adapted to local conditions. The ultimate effect of this training on the general standard of provincial agriculture is more problematical. Agricultural method will be vastly improved if even a portion of the knowledge acquired at school is put into practice. A short course for Northern Province Jeanes' Supervisors was held at Lunzuwa. The Supervisors showed a commendably remarkable keenness for agricultural work.

PART II.—FORESTRY.

49. It is estimated that all but one-third of the total area of Northern Rhodesia is covered by tree growth. The department can deal directly only with a very small proportion of this vast forest expanse of over 190,000 square miles. Its activities are concentrated in the two areas of greatest economic importance—the settled portion of the railway belt and the Mukusi (*Baikiaea plurijuga*) forests of the south-western corner of the Territory. Throughout most of the rest of the country the department can only act in an advisory capacity to Administrative and other departments.

50. One of the two Assistant Conservators remained seconded throughout the year to the Chamber of Mines for utilisation and survey work. The Northern Division was controlled by an Assistant Conservator and two Foresters, one of whom was appointed in May. The European staff in the Southern Division remained at one Forester and one part-time Forester.

51. The two outstanding features of the year were the greatly increased cutting of timber for mining purposes and the partial completion of an enumeration survey of the forests most accessible to the copper mines. Considerable replacement of imported by indigenous timber, partly as a war-time measure, and increased production of copper have now brought the current consumption of timber from the more accessible forests to a figure greatly in excess of the natural increment. This disquieting fact may be attributed almost entirely to war conditions. The high prices for timber prevailing in Southern Africa brought numerous enquiries on timber cutting projects for export. In view of the current situation these had to be discouraged in order to protect the interests of the main industry.

Demarcation of Forest Reserves.

52. A new reserve was proclaimed at Luanshya and an extension of 400 acres was made to the existing Chichele Forest Reserve. Three new reserves were proclaimed in Livingstone District and a small Protected Forest Area was created to preserve the amenities around the Kalambo Falls in Abercorn District.

53. By the end of the year the following 18 reserves had been established under the Forests Ordinance, 1941 :

Northern Division :	*Square miles*
Ndola Forest Reserve	17
Chichele Forest Reserve	9
Luanshya Forest Reserve	13
Mindola Forest Reserve	9½
Mufulira Forest Reserve	15
Chondwe Forest Reserve	6½
Miengwe Forest Reserve	37½
Songe-we-Lala Forest Reserve	22
Katanino Forest Reserve	18
Broken Hill Forest Reserve	48½
Lusaka North Forest Reserve	2
Lusaka East Forest Reserve	7
Lusaka South Forest Reserve	37
Kalambo Falls Protected Forest Area	2
	244

Southern Division :	*Square miles*
Livingstone North Forest Reserve	56
Katombora Forest Reserve	18½
Bombwe Forest Reserve	8½
Malavwe-Nachitwe Forest Reserve	245
	328
Total	572

This represents an increase of 336 square miles over the total area of Forest Reserves at the end of the previous year. Several other proposals for reservation are under consideration and some preparatory work has been carried out with a view to the reservation of further areas. Most of the Mukusi (*Baikiaea plurijugá*) forests in the Southern Division are still protected only by Native Authority Orders.

Industries and Exploitation.

(*a*) Crown Lands and Forest Reserves.

54. The volume of timber taken from Government land, a term embracing both Crown Land and Forest Reserve, was almost three times as great as that taken in 1942. This was caused chiefly by the transference to Government land of most of the timber-cutting operations of the copper mines whose timber resources on their own properties are nearing exhaustion.

55. The details of timber cut under licence for the copper mines are :

Mine	*Cubic feet*	*Fees collected*
Roan Antelope	152,000	£1,000
Nkana	163,000	£1,570
Nchanga	116,000	£990
Kipushi (Belgian Congo) ...	106,000	£1,200
Totals	537,000	£4,760

Mufulira Mine obtained all its supplies from its own land and most of the others cut part of their requirements from their private properties. The timber so derived is estimated to aggregate 261,000 cubic feet making a total consumption by the copper mining industry of approximately 790,000 cubic feet.

56. The Rhodesian Wood Industries continued to exploit Livingstone North Forest Reserve and an area of mixed woodland to the north. The company extracted some 75,000 cubic feet of mixed timber and produced 9,500 cubic feet of plywood and 1,800 cubic feet of veneers.

57. The number of poles cut, despite greatly increased consumption by Broken Hill Mine—now amounting to 33,000 poles, fell somewhat owing to a considerable decline in military requirements. More than half the total was cut under free licence for temporary Government buildings.

58. Firewood cut under licence rose from 34,000 cords to 53,000 cords.

59. A summary of the forest produce cut under licence in 1943 is given in the Appendix to this report. This summary excludes timber taken under the Barotse Forests lease by the Zambesi Saw Mills and other timber cut under Barotse Native Authority licences.

(*b*) Barotse Forests.

60. The Zambesi Saw Mills worked at full pressure throughout the year and employed an average of 120 Europeans and 4,000 Africans. Some 13,500 acres were exploited in Simungoma Forest in Sesheke District, yielding approximately 215 cubic feet of *Baikiaea* timber per acre. The company also exploited a large area of open woodland from which they extracted 74,500 cubic feet of Mukwa (*Pterocarpus angolensis*) and an aggregate of 70,000 cubic feet of Mungongo (*Ricinodendron rautanenii*), Muzauli (*Copaifera coleosperma*), Musheshi (*Burkea africanum*) and Mutuya (*Brachystegia spiciformis*). The total volume of timber in the round extracted by the Company was approximately 3,079,000 cubic feet. The output of sawn timber was :

	Cubic feet
Rhodesia Railway Sleepers	473,453
South African Railway Sleepers ...	13,544
Other Timbers Sold	490,773
Total	977,770

From the Company's operations in Sesheke District the Barotse Forest Fund derived a gross revenue of £5,184.

Imports and Exports.

61. Details of imports and exports are regarded as confidential and may not be published during the war.

DIVISIONAL OPERATIONS : SOUTHERN DIVISION.

62. The main work in this division is the control of exploitation of the *Baikiaea* forests and the protection of these forests, both exploited and unexploited.

Fire Protection.

63. In Livingstone and Sesheke Districts some 485 square miles of *Baikiaea* forests were protected by external and internal fireguards and constant patrolling. Early burning was carried out in the Mukwa-Mutondo woodlands in order to prevent the serious damage caused by late fires.

64. In Sesheke District only one serious fire occurred in the *Baikiaea* forests during the year and here some three square miles were damaged. A further 15 miles of boundary fireguard roads were made round the exploited forests. In Livingstone District fires again occurred in Yeta's forests and at Katambora and about seven square miles were burnt. All these fires were caused by Native honey-hunters and trappers. In Yeta's forests improvements were carried out to the internal fireguards and 42 miles of boundary fireguard roads were made.

Management and Surveys.

65. The stock map of the forests under exploitation was kept up to date and unexploited areas were reconnoitred. Measurements in a sample plot of *Baikiaea* showed the average annual girth increment to be but 0.53 inches. In healthy tall poles of this species the average increment was 0.75 inches.

DIVISIONAL OPERATIONS: NORTHERN DIVISION.

Fire Protection.

66. Early burning was carried out as a routine measure in all reserves and in exploited areas or areas under exploitation.

Management and Surveys.

67. In advance of their legal constitution as Native Trust Land, a scheme of agricultural resettlement was started in the middle of the year on Crown Land areas along the railway line to the south of Ndola. The demarcation of the boundaries of the four Forest Reserves in this region was pushed forward so as to ensure that they would be well defined to the incoming villages. At the same time certain internal surveys were carried out to ascertain what parts could, in the changed circumstances, be allotted for agriculture rather than forestry.

68. A rapid reconnaissance of the area between the upper Kafue and the Congo border was carried out to determine the need for forest reservation here. Proposals in respect of two blocks along the border have since been submitted.

Stocktaking Survey of the Copperbelt Forests.

69. Following the 1,200 square miles timber reconnaissance of 1942, a most extensive strip enumeration survey was undertaken by the Northern Rhodesia Chamber of Mines, with the financial support of Government. The staff was composed of 5 Geologists or Junior Surveyors, working under the direction of the Assistant Conservator who had been seconded by Government to the Chamber primarily as a Utilization Officer. By the end of the year more than two-thirds of the timbered areas of the Copperbelt had been covered by a 4 per cent. strip enumeration. 946 miles of sample strip were enumerated. With the co-operation of the Mufulira Copper Mines, a topographic map of the Copperbelt on the scale 1 : 50,000 was produced and a series of exploitation maps was compiled from the survey data. The yields, which were worked out in great detail, showed that there are 4 million cubic feet of good saw timber within easy hauling distance (16 miles) of the four mines ; and that there are another 4 million cubic feet within 30 miles of the mines. These results are disquieting as the present, admittedly emergency, consumption of the four mines is not far short of one million cubic feet a year. Yields per acre were low ; the average for all but the best areas lay between 50 and 70 cubic feet of good exploitable saw timber per acre. On the other hand, mining poles of 6″ and 8″ diameter were common over such extensive areas that they may be considered to be in plentiful supply.

Silviculture and Silvicultural Research.

70. Apart from early burning, the enforcement of elementary felling regulations and some small-scale clearings in young coppice crops, no silvicultural operations were carried out. In the *Brachystegia-Isoberlinia* woodland, coppice regeneration which will provide firewood and pole crops after clear-felling is not difficult to obtain, but a technique that will improve the productivity of timber areas has yet to be evolved. Exploitation for timber seldom removes more than four trees per acre with a total volume of less than 100 cubic feet.

71. Previously established experiments in silviculture and fire protection and trial plantations were maintained. Trial plantings of *Pinus patula* under a wider (9 ft. × 9 ft.) espacement and different degrees of soil preparation were made at Ndola. Small-scale trials with fast growing exotic species were extended to Broken Hill where there is a growing scarcity of mining poles. An observation test on the effect of cleaning surplus coppice stems in a plot of young natural regrowth was also started at Ndola.

Research in Timber Utilisation.

72. This was conducted throughout the year for the Northern Rhodesia Chamber of Mines by the seconded Assistant Conservator. Work was completed and unpublished reports were circulated among members on the following projects :

(*a*) Strength tests. The local *Brachystegia* and *Isoberlinia* timbers all gave high strength values ; about double those of imported Oregon Pine (Douglas Fir).

(*b*) Operation of Timber Impregnating Plants. Good absorptions of zinc salts were secured in local timbers using a 10 minute preliminary vacuum and 70 lb. per sq. in. pressure for half an hour.

(*c*) Air Seasoning. Useful drying curves for local timbers were produced from a full-scale seasoning experiment.

(*d*) Timber Borers. The life histories of two important timber pests were worked out, and fairly effective control measures were evolved. These included dipping in hot 3 per cent. sodium arsenite, now a standard practice on the mines.

(*e*) Wood Distillation.

(*f*) Pick Handles. Several local timbers were found to be as good as those imported from overseas.

(*g*) Tannin Content of Bark. Only two species, *Isoberlinia paniculata* and *Brachystegia utilis*, gave high values.

Several further projects were started but have not yet been completed or reported upon. These included the investigation of underground fungi; the natural resistance of local timbers to decay and the relative durability in underground conditions of *Brachystegia* timbers impregnated with zinc chloride, zinc sulphate, sodium silicofluoride, triolith, tanalith, creosote, etc.

Miscellaneous.

73. Serenje, Mkushi, Fort Jameson and Kawambwa Districts were visited to discuss Native projects with the Administration. An order for the early burning of areas of abandoned cultivation to assist in bush recovery was adopted by the Native Authorities of Mkushi. In Kawambwa District a scheme for organising forest control under the Lunda Native Authority was proposed by the District Commissioner and it is hoped that it can be developed next year.

74. In the Bangweulu Swamp area of the Luwingu District considerable populations occupy the treeless sandbanks separated by many miles of water from any forest country. The scarcity of building material is a very serious bar to the improvement of living conditions, and organised tree-planting was suggested by the District Commissioner. A start with a Eucalypt plantation scheme was made on the relatively accessible Ncheta Island. For uncertain reasons the results obtained by the end of the year were disappointing but the work is being continued.

75. Although concrete results were small, these out-district visits provided some idea of the forestry problems that urgently await attention and of the conditions under which they will have to be met.

C. J. Lewin,
Director of Agriculture.

Mazabuka,
6th April, 1944.

APPENDIX.

SUMMARY OF FOREST PRODUCE CUT UNDER LICENCE, 1943.

District	Timber (Cubic Feet)		Poles (Number)		Firewood (Cords of 128 stacked cu. ft.)		Revenue Collected (£)		
	Crown Lands	Forest Reserves	Crown Lands	Forest Reserves	Crown Lands	Forest Reserves	Crown Lands	Forest Reserves	Total
Ndola	154,511	9,088	1,031	50	9,421	6,028	1,506	741	2,247
Luanshya	131,675	22,310	2,768	285	552	10,507	1,122	824	1,946
Kitwe	182,695	2,063	6,423	282	8,111	4,376	1,738	340	2,078
Mufulira	1,238	—	2,226	—	1,634	—	143	—	143
Chingola	129,407	—	1,600	—	2	—	1,040	—	1,040
Broken Hill	11,812	56	31,933	1,867	3,123	1,046	575	187	762
Lusaka	271	670	100	3,650	858	2,961	81	290	371
Livingstone	71,305	—	630	—	1,959	—	856	—	856
All other Districts	4,848	—	1,116	—	209	—	72	—	72
	687,762	34,187	47,827	6,134	25,869	24,918	7,133	2,382	9,515
Combined totals Crown Lands and Forest Reserves	721,949 cu. ft.		53,961 poles		50,787 cords		£9,515		
Lenje Native Reserve...	618 cu. ft.		527 poles		1,371 cords		£194		
Free issues. All Districts	20,433 cu. ft.		64,512 poles		992 cords		£381 (value)		
GRAND TOTALS	743,000 cu. ft.		119,000 poles		53,150 cords		£10,090		